

### REMARKS

Upon entry of the present amendment claims 1-13 and 15-26 are pending in the application. Claims 1-13 and 15-20 have been amended in accordance with the requirements of U.S. patent practice. New claims 21-26 add no new matter, as these claims contain subject matter deleted from the amended claims. Applicants respectfully request entry of the preliminary amendment.

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201220-88T6900T

**MARKED UP VERSION OF THE AMENDMENTS**

**IN THE SPECIFICATION**

After the title, please insert --This application is a National Phase Application of Patent Application **PCT/EP00/08032** filed on 17 August 2000.--

**IN THE CLAIMS:**

Please substitute amended claims 1-13 and 15-20 as follows, please add new claims 21-26 and delete claims 12-14. As required by 37 C.F.R. §1.121, a marked up version of the amendments for claims 1-13 and 15-20 are listed below.

1. (Amended) A sol-gel coating material comprising
- (A) an acrylate copolymer solution comprising at least one acrylate copolymer (A1) prepar[abl]ed by copolymerizing at least the following monomers:
- a1) at least one (meth)acrylic ester which is substantially free of acid groups,
- a2) at least one ethylenically unsaturated monomer which bears at least one hydroxyl group per molecule and is substantially free of acid groups, and
- a3) at least one ethylenically unsaturated monomer which bears per molecule at least one acid group which is convertible into the corresponding acid anion group;
- (B) a sol prepar[abl]ed by hydrolyzing, condensing and complexing
- B1) at least one hydrolyzable metal compound of the general formula I



where the variables and the index have the following meaning:

M = aluminum, titanium or zirconium,

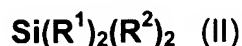
R = hydrolyzable groups, hydroxyl groups, [and] nonhydrolyzable groups, and mixtures thereof, with the proviso that there is at

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least one[ and there are preferably at least two] hydrolyzable group[(s)], and

n = 3 or 4;

B2) at least one hydrolyzable silane of the general formula II



in which the variables  $\text{R}^1$  and  $\text{R}^2$  have the following meaning:

$\text{R}^1$  = alkyl radicals, [and/or] cycloalkyl radicals, and mixtures thereof, and

$\text{R}^2$  = alkoxy radicals, [and/or] cycloalkoxy radicals, and mixtures thereof;

and

B3) at least one hydrolyzable silane of the general formula III



where the variable R has the meaning given above;

with the proviso that the silane (B3) is not a silane (B2) according to the general formula II, and

(C) 0 to 40% by weight, based on the total amount of coating material, of a [stock coating] material[, ] prepar[abl]ed by hydrolyzing and condensing at least one hydrolyzable silane (B3) of the general formula III.

2. (Amended) The sol-gel coating material of claim 1, characterized in that the radical  $\text{R}^1$  is at least one group selected from methyl, ethyl, propyl, isopropyl, n-butyl, sec-butyl, tert-butyl, pentyl, hexyl, cyclopropyl, cyclobutyl, cyclopentyl and/or cyclohexyl groups and the radical  $\text{R}^2$  is methoxy, ethoxy, propoxy, isopropoxy, n-butoxy, sec-butoxy, tert-butoxy, pentyloxy, hexyloxy, cyclopropyloxy, cyclobutyloxy, cyclopentyloxy, [and/or] cyclohexyloxy groups, and mixtures thereof.
3. (Amended) The sol-gel coating material of claim 1[ or 2], characterized in that the molar ratio of silane (B2) to silane (B3) is 1 : 10 to 1 : 1[ and especially 1 : 6 to 1 : 2].

4. (Amended) The sol-gel coating material of [one of ]claim[s] 1[ to 3], characterized in that the atomic ratio of metal M to silicon is 1 : 10 to 1 : 1.5[ and especially 1 : 6 to 1 : 2].
5. (Amended) The sol-gel coating material of [any of ]claim[s] 1[ to 4], characterized in that it is aromatics free.
6. (Amended) The sol-gel coating material of [any of ]claim[s] 1[ to 5], [characterized in that it ]compris[es]ing\_, in each case based on its total amount, 1 to 30[, preferably 2 to 20 and especially 3 to 15]% by weight of the acrylate copolymer solution (A) and 5 to 50[, preferably 10 to 40 and especially 15 to 30]% by weight of the sol (B) and also up to 94% by weight of at least one suitable additional constituent (C).
7. (Amended) The sol-gel coating material of [any of ]claim[s] 1[ to 6], characterized in that, in the general formulae I and II,
  - the nonhydrolyzable groups R are at least one group selected from alkyl groups[, especially] of 1 to 4 carbon atoms; alkenyl groups[, especially] of 2 to 4 carbon atoms; alkynyl groups[, especially] of 2 to 4 carbon atoms; [and/or ]aryl groups[, especially] of 6 to 10 carbon atoms; and mixtures thereof, and
  - the hydrolyzable groups R are at least one group selected from hydrogen atoms, alkoxy groups[, especially] of 1 to 20 carbon atoms; alkoxy-substituted alkoxy groups of 3 to 20 carbon atoms; acyloxy groups[, especially] of 1 to 4 carbon atoms; alkylcarbonyl groups[, especially] of 2 to 6 carbon atoms; and mixtures thereof.
8. (Amended) The sol-gel coating material of claim 7, characterized in that
  - the hydrolyzable groups R are at least one group selected from methoxy, ethoxy, n-propoxy, i-propoxy, n-butoxy, sec-butoxy, beta-methoxyethoxy, acetoxy, propionyloxy, [and/or ]acetyl groups and mixtures thereof, and the

-nonhydrolyzable groups R are at least one group selected from methyl, ethyl, propyl, butyl, vinyl, 1-propenyl, 2-propenyl, butenyl, acetylenyl, propargyl, phenyl, [and/or and ]naphthyl groups, and mixtures thereof.

9. (Amended) The sol-gel coating material of [any of ]claim[s] 1[ to 8], characterized in that the nonhydrolyzable groups R contain at least one functional group[, especially at least one epoxide group, amino group, olefinically unsaturated group, mercapto group and/or isocyanate group and/or their reaction products with further reactive compounds].
10. (Amended) The sol-gel coating material of [any of ]claim[s] 1[ to 9], characterized in that complexing is effected using organic compounds which form chelate ligands.
11. (Amended) The sol-gel coating material of [any of ]claim[s] 1[ to 10], characterized in that it is a sol-gel clearcoat material.

Please delete claims 12-14

15. (Amended) A process for producing mar-resistant sol-gel coatings on single-coat or multicoat paint systems by
  - (i) applying a [single-coat or multicoat ]paint system to a[ primed or unprimed] substrate,
  - (ii) applying a sol-gel coating material atop the [single-coat or multicoat ]paint system, and
  - (iii) curing the sol-gel coating material,characterized in that the applied[a] sol-gel coating material is the sol-gel coating material of [as claimed in any of ]claim[s] 1[ to 11 is used].
16. The process of claim 15, characterized in that the applied sol-gel coating material is cured by irradiation with intermediate IR radiation.

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17. (Amended) The process of claim 15 or 16, characterized in that the [single-coat or multicoat ]paint system has been completely cured.
18. (Amended) The process of [any of ]claim[s] 15[ to 117], characterized in that the paint system is selected from single coat paint systems and multicoat paint systems[s are automotive original equipment manufacturing coatings, automotive repair coatings, industrial coatings, including coil coatings and container coatings, plastics coatings and furniture coatings].
19. (Amended) A[S]sol-gel coating[s] prepar[abl]ed from a sol-gel coating material as claimed in [any of ]claim[s] 1[ to 11 and/or by the process as claimed in any of claims 15 to 18].
20. (Amended) A[S]substrate[s] comprising at least one sol-gel coating as claimed in claim 19.

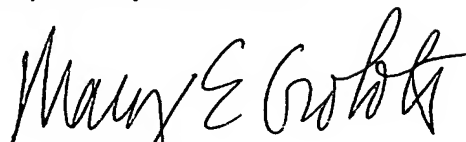
Please add the following new claims 21-26:

21. (New) The sol-gel coating material of claim 3, characterized in that the molar ratio of silane (B2) to silane (B3) is 1 : 6 to 1 : 2.
22. (New) The sol-gel coating material of claim 4, characterized in that the atomic ratio of metal M to silicon is 1 : 6 to 1 : 2.
23. (New) The sol-gel coating material of claim 6, comprising , in each case based on its total amount, 2 to 20% by weight of the acrylate copolymer solution (A) and 10 to 40% by weight of the sol (B) and also up to 94% by weight of at least one suitable additional constituent (C).
24. (New) The sol-gel coating material of claim 23, comprising , in each case based on its total amount, 3 to 15% by weight of the acrylate copolymer solution (A) and 15 to 30% by weight of the sol (B) and also up to 94% by weight of at least one suitable additional constituent (C).

25. (New) The sol-gel coating material of claim 9, characterized in that the nonhydrolyzable groups R contain at least one functional group selected from epoxide groups, amino groups, olefinically unsaturated groups, mercapto groups, isocyanate groups, and mixtures thereof.
26. (New) The process of claim 18, characterized in that the paint system is selected from automotive original equipment manufacturing coatings, automotive repair coatings, industrial coatings, plastics coatings and furniture coatings.

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